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his own instinctive effort to seize the attacking party, and to put him in the place of the lowermost dog in the fight. Then he bites, and if he gets the dog by the back, and if this be a lean thin dog, woe be to the dog. A fat one has a better chance. The bear cannot so well get his broader back into his mouth, and, the skin slipping, he generally escapes with only a flesh-wound. Dogs, at first, often refuse bear-meat, but come to prefer it before all others, as does the hunter.

When hard pressed, the bear will back into a dense patch of cane or into a bunch of bushes, and, standing erect on his hinder parts, make the best fight he is capable of. This is the time for the hunter, when his attention is absorbed by the dogs. Occasionally one is started, which runs steadily on and escapes. Females and young commonly climb, or "tree" in hunters' dialect. Generally, they are then easily shot; but sometimes, on the hunter's approach, they will drop from the tree and run on again.

I once met a female and two cubs. I shot the mother fair in the breast, aiming at the white spot. The cubs treed, and I killed them; I then went in search of the old one, fully expecting to find her, close by, dead. As she ran away she bled profusely, but the blood grew less, and finally stopped entirely, and I never found the bear. How she could go quite off with such a loss of blood, was a mystery.

THE GEOGRAPHICAL DISTRIBUTION OF ANIMALS.

BY SIDNEY I. SMITH.

(Concluded from page 23.)

Among terrestrial and fluvial species, topography is much more powerful in limiting geographical distribution, than it is among marine species. The separation of lands by broad ocean waters, without change of temperature, is sufficient to prevent the mingling of their land faunæ to any extent, while they may have most of their marine species in common. Such cases are numerous; at the Galapagos, for instance, none of the truly land species are known to occur in any other region, while a large portion of the marine species are found also on the American coast. Temperature is undoubtedly the most effective cause in limiting the diffusion of land and fresh water, as well as marine animals; but its influences are much obscured by those of humidity, and by the varying character of soils, waters, and the resulting vegetation.

Temperature, as a result of or combined with topography, forms a very effective force in limiting the distribution of land animals. High and continuous mountain ranges present an almost impassable barrier to the migration of most species. Thus the physical features which separate faunæ from regions east and west may be so strongly marked, that they more than counterbalance the climatic effects of latitude. In North America, the faunæ on the east of the Rocky Mountains are very different from those on the west, and the inclosed central table-lands are occupied by still different faunæ. The birds of Arizona resemble those of the table-land of Mexico rather than those of California or of Texas. These physical features even effect a change in the migrations of the birds of this region; many of the birds of the Colorado valley, instead of migrating far to the north in summer, turn to the east and breed in the region north of Fort Whipple.*

Climatic influences, almost alone, limit the distribution of mountain vegetation; and, through the vegetation, more than directly that of mountain animals. The narrow limits within which mountain species are restricted show very plainly the effect of climatic influences. Among the butterflies of the White Mountains of New Hampshire, the abundant *Chionobas semidea* Edw., is restricted to the loftiest summit, never breeding without these narrow limits, although frequently blown into the lower vallies. In a zone below these lofty summits, but not extending to the base of the mountains, *Argynnis Montinus* Scudd. is found, yet never at the summit with the *Chionobas*, nor about the base with the species of the Canadian or Virginian faunæ.* Many other species of insects, and many plants, are restricted in the same manner. It cannot be that these species are thus restricted in their distribution merely by some primary, innate principle, which prevents their diffusion; for, like their marine relatives, they have not always been thus restricted.

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* Dr. E. Coues, Prodrome of a work on the Ornithology of Arizona Territory, noticed in the NATURALIST, Vol. I, p. 209.

It is not so easy to trace these migrations of species on the land as it is in the ocean, for land species are not so often left fossil in their ancient homes; and, as there are no authentic records of land animals existing through the Glacial epoch, we can go back no farther than its decline. Yet it is worthy of remark, that the arctic land fauna of the Tertiary period, like the marine, was probably circumpolar; and that the gradually advancing cold of the glaciers would have driven many arctic plants and animals southward, and, living just beyond the border of the ice belt, they would have followed it back with the glacial decline.

At the close of the Glacial epoch, the fauna and the flora of New England must have been very much like that of the coast of Labrador at the present time. As the climate became gradually warmer, the more hardy species would have retreated northward and up the mountain sides, while others less hardy, became extinct during these climatic changes. As the migration continued, the mountain summits were left as aërial islands in the more southern faunæ.†

The known land fossils of this period of change are as yet very few, but the faunal migration has left abundant evidence in the northern species scattered along its path upon the mountains, or wherever the climatic or topographical influences have not annihilated them.

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* S. H. Scudder, Remarks on some Characteristics of the Insect Fauna of the White Mountains. Journal of the Boston Society of Natural History, Vol. VII.

† Packard, Glacial Phenomena of Labrador, p. 256.

The flora of the higher mountains of New England and the Middle States is quite identical with that of higher North American latitudes. All the plants of the White Mountains are now growing upon the coast of Labrador. As might be expected, the fauna of these mountains agrees with the flora. The larger animals would not, of course, be expected to occur in so restricted an area; still, one or two northern birds are found in summer, and many species of insects—Coleoptera, Diptera, Lepidoptera, and Orthoptera—are common to the mountains and places farther north. There are, however, some forms which appear to be peculiar to the mountain fauna, but more careful and extended investigation in the northern regions may prove many or even all of them to belong to species still existing at the north.

The plants and the birds of the coast of Maine, where the cooling effect of the arctic current is still felt, are subarctic in character, and very different from those inland. *Potentilla tridentata* and *Alsine Grœnlandica*,* species characteristic of the flora of Labrador and the New England mountain summits, with *Pupilla badia*, still linger as far south as Portland. Thus upon the land, as in the ocean, there are southern outliers of northern faunæ which are relics of the northern march of life during the close of the Glacial period.

The influence of winds in animal distribution is very slight, and seems wholly a disturbing power; yet it should not be passed over in silence, for it helps explain the wonderfully wide diffusion of a few species. The winds may transport animals great distances, even over oceans, and drop them alive among the species of other faunæ. Several of our American birds have been carried thus to Europe so often, that they are now catalogued as British species, although they are never known to breed there; and European species have frequently been taken upon the American coast. It is not very probable that land birds have crossed the Atlantic in this way and become established in the opposite country, but in the case of northern aquatic birds, it is by no means impossible that whole flocks may have crossed the ocean, and become inhabitants of both shores of the Atlantic. Most of the birds that are common to Europe and North America are arctic aquatic species. With insects there is a still greater chance of being carried from country to country by winds. That they have never been known to cross the ocean, as birds, is very poor evidence that they do not do so, for hundreds might arrive yearly and not be noticed. Insects have frequently come upon vessels at great distances from land, and there is no reason why they should not be carried by winds as far as birds. Once arrived in a new country, the chances of their becoming permanently established are very much greater than for birds, for a single female with eggs might be sufficient to introduce the species. Some of the facts mentioned below in regard to the introduction of insects through man's agency, show how easily they may become established.

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* At Paris, Maine, about forty miles north of Portland, and just on the coast line of the Leda Clay epoch, I have found both these arctic plants springing from the gravel in a railway cut, as if to mark their home of a former age. The occurrence of *Sedum Rhodiola* in Bucks county, Pennsylvania, mentioned by Professor Porter in this volume of the NATURALIST, p. 39, is a much more interesting relic of the Glacial epoch.

Of the organic causes in animal distribution, the influence of animals themselves is very slight compared with that of man. Still, many species, carried by the winds or by man's influence from their original homes into other regions, are destroyed by native carnivorous species, their permanent introduction prevented, and the mingling of far-separated faunæ somewhat lessened. The effect produced by animals in diffusing other species is perhaps greatest in carrying parasites from place to place. A species is seldom introduced without some of its parasites, and it might even introduce them without becoming introduced itself, for parasited cocoons and eggs of insects, or living insects and other animals infested by parasites, might be carried great distances, and the parasites thus introduced attack other species.

Man, with boundless aspirations and governed in all things by an influence within himself, is given a power in nature second only to his Creator; with control over physical causes, he is governed by no laws of geographical distribution, and, traversing the whole earth at his will, he has carried, in spite of climatic influences, species from continent to continent, and almost from pole to pole. His influence—far above all other secondary causes, and uncontrolled by the laws imposed upon mere animals—seems only a disturbing force among the naturally harmonizing laws of the diffusion of life. Many of the changes which man has wrought in the distribution of animals are so evident and so universally understood, that it is useless to refer to them here, and we will allude only to some of those which bear more directly upon our understanding of the geographical distribution of species.

By changes in the minor physical features of regions, man has often adapted them to species of other regions. The Cliff-swallow was formerly known only from far west of the Mississippi, where there were extensive limestone cliffs for it to nest upon; but now that the buildings of man have made places for its habitation, it has spread from the Mississippi all over the Atlantic States.*

The New Potato-beetle (*Doryphora 10-lineata*), which is so destructive in the West, was long ago known at the base of the Rocky Mountains in Colorado, feeding upon a wild species of *Solanum* peculiar to that region. Civilization, pushing westward, at last extended its fields of cultivated plants far west of the Mississippi into this region. The potato (a species of *Solanum*) was well adapted to feed the beetle, and was of course attacked by it. The broad fields of cultivated plants were much better fitted for its increase than the scattered wild ones, and it rapidly diffused itself eastward. In 1864 it had crossed the Mississippi, and now it has covered half of the State of Illinois.*

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* A. E. Verrill, Proceedings of the Boston Society of Natural History, Vol. IX, p. 276.

Three common species of butterflies in Eastern North America,—*Vanessa Antiopa*, *Cynthia cardui*, and *Cynthia Atalanta*,—long known to be identical with European species, have been asserted to be natives of this country, and the possibility of their introduction from Europe has recently been questioned.† But, within a very few years, there has been a well-authenticated instance of the naturalization of an European butterfly in Canada. *Pieris Rapæ*, the Cabbage-butterfly of Europe, was introduced at Quebec about 1859, and, in 1863, it had become very abundant within a circle of forty miles radius about that city.‡ If butterflies are introduced and spread so rapidly now, there is no reason why the other butterflies mentioned, all of which feed upon introduced plants, should not have been introduced and diffused over all the eastern part of the country long before entomologists began to study the distribution of species.

Man's influence is perhaps more noticeable in restricting the range of, or wholly destroying many species of animals. Within a few centuries several of the largest birds have become extinct through his agency, the larger wild animals have been mostly driven from civilized countries, the relative abundance of the different classes of animals has been materially changed, and the natural harmony which must have prevailed in the distribution of life has been destroyed, for man cannot change the relative abundance of a single species without affecting indirectly myriads of animals.

If man has wrought such vast changes within the short period of our written history, what must be the sum of all his influence in past ages? Is it too much to say that his influence aided in the extermination of those monsters of the last geological epoch, the Mastodon, the Irish Elk, the Cave-bear, and all those wonderful animal forms that passed away with the appearance of man?

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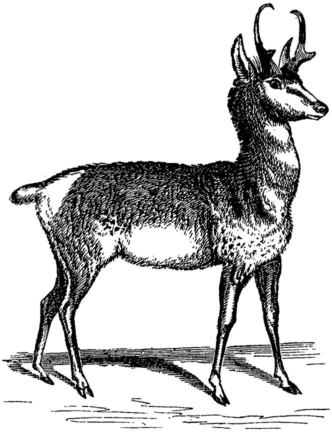
* B. D. Walsh, Practical Entomologist, October, 1865, and November, 1866.

† Ibid., On certain Entomological Speculations of the New England School of Naturalists. Proceedings of the Entomological Society of Philadelphia, Vol. III, p. 207.

‡ G. J. Bowles, On the Occurrence of Pieris rapæ in Canada. Canadian Naturalist, Vol. I, No. 4, August, 1864.

THE PRONG-HORN ANTELOPE.

BY W. J. HAYS.



THE PRONG-HORN ANTELOPE.
From Tenney's Zoology.

In a recent number of the Naturalist is a letter from Dr. Coues on the animals of our Western plains. Among other quadrupeds he describes the *Antilocapra Americana*, or Prong-horn Antelope, and says that they do not shed their horns. It is somewhat strange, that, although this animal has been known so long, so little is known of its habits.

A few years since Professor Baird received a letter from Dr. Canfield, who had spent some years among these animals, announcing the fact the antelope did actually shed its horns.

As this animal has always been supposed to belong to that class of ruminants called hollow-horned, the same as the cow, sheep, and goat, Professor Baird looked upon the statement as a delusion of the writer's, and paid no farther attention to the matter, until, in 1865, a young male antelope was taken to the Zoölogical Gardens of London; this was the first animal of the kind ever taken to Europe.

One morning the keeper discovered that one of the horns